

REMARKSRejection under 35 U.S.C. 102(b)

Claims 1 and 11 stand rejected under 35 U.S.C. 102(e) as being anticipated by Simon et al. (U.S. Patent No. 6,990,368).

Simon discloses a medical imaging device that includes an imaging device for capturing two or more image data sets representative of a patient. As shown in Fig. 1 below, the imaging device include a C-arm 103 that is attached to a base 102 and an X-ray source 104 is located at one of the arm 103, while an X-ray receiving section 105 is located at the other end of the arm 103.

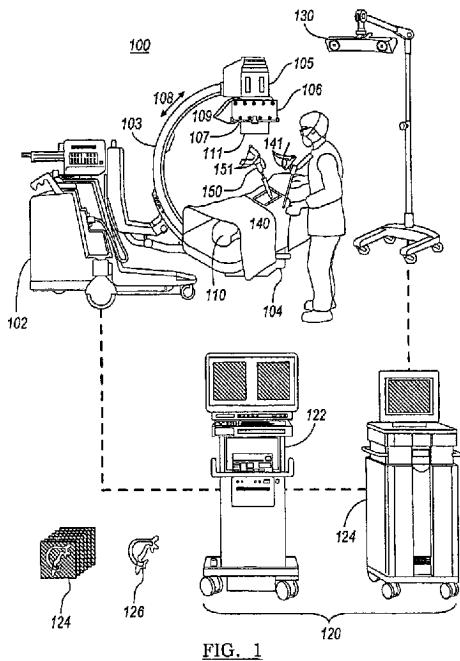


FIG. 1

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The imaging device also includes a calibration and tracking target 106 *attached to the x-ray receiving section 105*. The calibration target 106 includes sensors 108, tracking targets 109 and calibration markers 111. Simon discussed on column 4, lines 17-34 that a calibration process is required that involves placing “calibration markers” in the path of the X-ray, where *a calibration marker is an object opaque or semi-opaque to X-rays*. In Simon, the calibration markers are in the form of **calibration markers 111** which are rigidly arranged in predetermined patterns in one or more planes and are *visible in the recorded images*. In Simon, as shown above, the calibration markers 111 which form the impression on the recorded image are clearly located remote from the object (i.e., patient) and instead form a part of and are connected to the X-ray receiving end 105.

The system of Simon also includes a tracking subsystem that is formed of position location sensors and tracking targets that are embedded in different system components and accompany computational software implemented in an imaging processing device 120. For example, an instrument 140 can be embedded with tracking targets 141. In addition and as noted by the Examiner, the system can also include a dynamic reference frame marker 150 that is attached in a fixed position relative to a portion of the patient 110 to be operated on. In the example shown, the marker 150 is attached to a portion of a spine. *The reference frame marker 150 is embedded with tracking targets 151, such as infrared reflectors or emitters*. In this way, the tracking sensor 130 is able to determine the location of the reference frame marker 150 in 3D space.

In rejecting both independent claims 1 and 11, the Examiner has equated the claimed target to the reference frame marker 150; however, as set forth below, Applicant

respectfully disagree with such proposal. In particular, claim 1 recites a number of steps including the step of determining the position of a target with respect to the device based **on an impression of the target on the image of the object**. The target is mechanically connected to the **object**. Thus, the member that is directly connected to the object (e.g., a patient) forms an impression on the image of the object. In Simon, the only component that is even attached to the object (e.g., patient) that is to be imaged is the reference frame marker 150. This explains the Examiner's rationale in equating the marker 150 to the claimed target; however, this is where the similarities end in that the marker 150 is only used in tracking system, such as a 2D tracking system, that serves only to identify the location of the marker 150 in space.

Applicant respectfully submits that the marker 150 does not form an impression on the image in any manner, as required by the claim, since the elements 151 that are embedded therein serve a completely different purpose. They are not opaque elements that appear in the recorded image of the object but rather are merely tracking targets that are picked up by the tracking sensor 130.

The marker 150 is more analogous to Applicant's reference bodies 21 and 26 that are part of a 2D tracking system and allow one to know where the patient is in space, etc. However, reference bodies 21 and 26, as set forth in dependent claim 2, are used to determine the position of the target with respect to the reference frame since the bodies are mechanically connected to the target. However, as with Simon's marker 150, Applicant's reference bodies 21, 26 do not serve to form an impression on the recorded image of the object.

As stated above, Simon's calibration markers (opaque elements) are located at the X-ray receiving end 105 which is not at connected to the object to be imaged (e.g., patient). Simon thus fails to teach a target that is connected to the object (patient) **and** serves to form an impression on the image of the object. Simon thus teaches a completely different calibration process for determining the location of the imaging device. The above step of claim 1 is therefore lacking in Simon.

Claim 1 also recites the steps of determining the position of the target with respect to the reference frame and determining the position of the device with respect to the reference frame based on the position of the target with respect to the device, and the position of the target with respect to the reference frame. Applicant respectfully submits that these steps are not disclosed in Simon for the reasons stated above on the basis that Simon teaches a conventional location and conventional use of opaque calibration markers that are not connected to the object (patient).

Based on the foregoing, reconsideration and allowance of claim 1 are respectfully requested based on Simon failing to disclose one more elements of claim 1.

Similarly, claim 11 recites a system that is neither disclosed nor suggested by Simon.

Claim 11 requires a target that is connected to the object and includes a plurality of elements opaque to X rays. Each of the plurality of opaque elements is capable of providing a characteristic impression on the radiography of the object. As discussed

above with respect to claim 1, the only component that is mechanically connected to the object to be imaged (patient) is reference marker 150; however, reference marker 150 does not carry opaque elements for forming an impression on the recorded image of the object but rather only carries traditional tracking elements to permit the location in space of the marker 150 to be ascertained.

Accordingly, Simon fails to include the claimed target that is *connected to the object* since the only object connected to the patient (object) is merely a tracking member as opposed to one that forms an image on the recorded image for determination of the location of the target relative to the device.

Claim 11 also recites that the system is adapted to determine the position of the device with respect to a reference frame based on the position of the target with respect to the reference frame on the position of the target with respect to the device.

Based on the foregoing, reconsideration and allowance of claim 11 are respectfully requested.

Rejection under 35 U.S.C. 103(a)

Claims 2-6 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Simon et al. in view of Zheng et al. (U.S. Patent No. 7,117,027).

Claims 2-6 should be allowed as depending from what should be an allowed independent claim 1. Applicant respectfully submits that Zheng fails to cure the deficiencies of the primary reference as noted above. In addition, these claims should be

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allowed since they are patentable in and of themselves. For example, as noted above, claim 2 recites the presence of a rigid localization body that is mechanically *connected to the target* and permits determination of the position of the target with respect to the reference frame.

Claims 8-10 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Simon et al., in view of Krausse et al. (U.S. Patent Application Publication No.: 2004/0068187).

Similarly, claims 8-10 should be allowed as depending from what should be an allowed independent claim 1. Applicant respectfully submits that Zheng fails to cure the deficiencies of the primary reference. In addition, these claims should be allowed since they are patentable in and of themselves. For example, claim 8 recites the construction of the claimed target. The cited references fail to show a target having the claimed characteristics (e.g., formation of an impression on the recorded image) that is connected to the object to be imaged.

New Claims

Applicant has added a new claim 12 that recites a method for determining the position of a device providing images by X rays with respect to a reference frame as an image of an object is taken. The method includes the steps of: determining the position of a target with respect to the device based on an **impression of the target** on the image of the object. The target is **mechanically connected to the object** and includes a plurality of elements **opaque to X rays which define the impression of the target**. The method also includes the

step of determining the position of the target with respect to the reference frame *using a rigid body that is mechanically connected to the target.*

Applicant respectfully submits for reasons discussed hereinbefore, that the above elements are neither disclosed nor suggested by the cited references.

Claims 13-15 should be allowed as depending from what should be an allowed independent claim 12.

In view of the above amendment, Applicant believes the pending application is in condition for allowance.

It is believed that no fees are due or that all fees have been paid; however, if the Patent Office believes that fees due, Deposit Account No. 50-4570 can be accessed up to \$800.00.

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